

How to Cite:

Rauf, M. A., Raza, S., Safi, S. I., Arafat, Y., Khan, J., & Khan, N. (2023). Frequency of cardiac events in patients admitted with dengue fever at Kuwait Teaching Hospital Peshawar. *International Journal of Health Sciences*, 7(S1), 85–92. <https://doi.org/10.53730/ijhs.v7nS1.14156>

Frequency of cardiac events in patients admitted with dengue fever at Kuwait Teaching Hospital Peshawar

Muhammad Abdur Rauf

FCPS, FACC, FESC, FSCAI, Assistant Professor, Cardiology Department, Kuwait Teaching Hospital, Peshawar Medical College, Peshawar, KP, Pakistan

Sarmad Raza

MBBS, Post Graduate Resident, Cardiology Department, MTI Mardan Medical Complex, Mardan, KP, Pakistan

Shoaib Iqbal Safi

FCPS, Senior Registrar Cardiology Department, Kuwait Teaching Hospital, Peshawar Medical College, Peshawar, KP, Pakistan

Corresponding author email: shoaibsafi910@gmail.com

Yasir Arafat

FCPS, Assistant Professor, Cardiology Department, Qazi Hussain Ahmed Medical Complex, Nowshera, KP, Pakistan

Jehandad Khan

MBBS, Post Graduate Resident, Cardiology Department, MTI Mardan Medical Complex, Mardan, KP, Pakistan

Noman Khan

FCPS, Consultant Cardiologist, DHQ Hospital KDA, Kohat, KP, Pakistan

Abstract---Objectives: To determine the frequency of various cardiac events in patients admitted with dengue fever at Kuwait Teaching Hospital, Peshawar. Materials and methods: NS1 viral antigen detection method was used for serologic confirmation of dengue virus infection. All patients provided their informed permission before being assigned to a sample or having their data used in study. The researcher took the history and confirmed the presence of risk factors like hypertension and diabetes and along with that ECG and echocardiographic evaluation of all the patients at the time of admission and discharge were recorded. Results: Electrocardiographic assessment revealed that 91 (58%) patients had normal ECG, 04 (2.52%) had broad QRS complexes, 09 (5.73%) had diffuse T-wave inversions, 02 (1.27%) had low-voltage QRS complexes and 12 (7.64%)

patients had non-specific ST segment changes while sinus bradycardia was documented in 09 (5.73%) patients, sinus tachycardia in 24 (15.28%) and atrial fibrillation in 06 (3.82%) patients. Echocardiographic evaluation showed that all the 157 (100%) patients had normal left ventricular ejection fraction, 05 (3.18%) had left ventricular diastolic dysfunction and only 04 (2.55%) developed pericardial effusion while neither of the patient had global hypokinesia or any new valvular lesions. Conclusion: It is observed that cardiac involvement of any degree is not uncommon in dengue fever. Therefore, it is of utmost importance that all the patients presenting to hospital with dengue virus infection should be screened for any possible cardiac involvement for prompt and timely management.

Keywords---cardiac event, electrographic assessment, dengue fever, dengue virus.

Introduction

The most prevalent and significant viral disease affecting humans is dengue fever, which is spread by the stings of female *Aedes* mosquitoes. It is also referred to as bone breaking fever due to the severity of its symptoms like muscular and joint aches. *Aedes aegypti* is the peculiar type of mosquito that is involved in the transmission of dengue virus commonly present in tropical and subtropical regions of the world. Although the illness may follow an asymptomatic course in some individuals, but on the other hand can be severe enough to cause significant morbidity and mortality. Moreover, it has been observed over the period of time that incidence of dengue has alarmingly increased to such extent where it has become endemic in certain parts of the world.^{1,2}

Dengue virus (DENV) affects almost 390 million people around the globe annually, among which 96 million (25%) develop a full-blown illness that exhibits the typical clinical hallmark of DENV infection.³ Pakistan, being a temperate zone country, is immensely affected by dengue throughout the year because of its hospitable environment and outbreaks happen mostly during monsoon season particularly in areas of Khyber Pakhtunkhwa, Punjab and Sindh.^{4,5}

Following a period of incubation of 5-8 days, the normal course of dengue viral infection starts with an abrupt onset of high-grade fever, frequently accompanied by chills, headache (typically involving the retro-orbital area), discomfort, arthralgia, myalgia, anorexia, and abdominal discomfort, with a maculo-papular rash appearing after 3-4 days. The pyrexia may have a biphasic pattern and continue for 2-7 days.^{6,7,8}

Clinical signs of infection with the dengue virus may affect the heart, and they can range from subclinical bradycardia to dangerous myocarditis. Some of the frequently encountered cardiac abnormalities include sinus bradycardia, prolongation of PR interval, nonspecific ST-T changes, transient atrioventricular blocks and ventricular arrhythmias.^{9,10,11,12} Multiple studies have also established

the association of dengue virus infection with myocarditis resulting in anomalies in local wall motion, effusion of the pericardium, and reduced left ventricular systolic function.^{13,14,15} In our study, we have tried to assimilate various cardiac manifestations through ECG and echocardiography in patients diagnosed with dengue virus infection.

Materials and Methods

On 157 dengue fever patients with serological confirmation, just one center prospectively study of observation was carried out, admitted in Kuwait teaching hospital, Peshawar between February to November 2022. NS1 viral antigen detection method was used for serologic confirmation of dengue virus infection. Patients with any prior cardiac, pulmonary or thyroid disease, active malignancy, age <18 years and >60 years and use of medications like beta agonists, beta blockers, Calcium channel blockers, digoxin and theophylline or its derivatives were excluded from the study.

Patients from the Department of Cardiology at Kuwait Teaching Hospital, Peshawar who presented with Dengue fever and met the inclusion criteria were included in the research. Prior to conducting the research, approval from an institutional ethical review committee was sought. All patients gave their informed permission before being assigned to a sample or having their data used in research. Brief history of demographic data (age and residence status) was taken. The researcher took the history and confirmed the presence of risk factors like hypertension and diabetes and along with that ECG and echocardiographic evaluation of all the patients at the time of admission and discharge were recorded.

With “SPSS Version 22”, data analysis was carried out. Age's average and standard deviation were computed while frequency for categorical variables such as gender, diabetes and hypertension.

Results

The screening of 325 individuals with clinical signs of dengue fever in which 168 individuals were excluded and only 157 patients with dengue virus infection were included in this study as per set criteria. Among 157 selected patients, 89 (56.69 %) were males and 68 (43.31%) were females [Figure 1]. Hypertension was present in 12 (7.64%) while diabetes in 08 (5.09%) patients. The mean age of study population was 48.48 ± 6.9 years [Table 1].

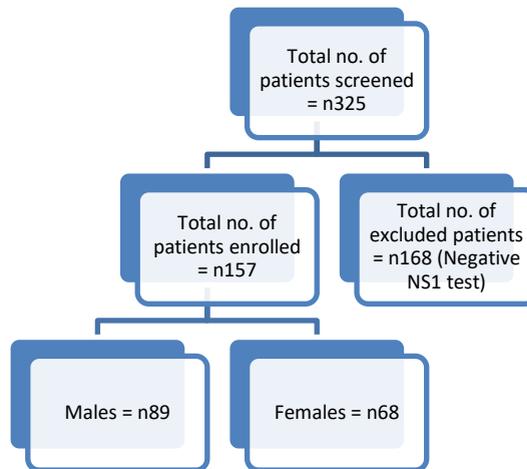


Figure 1: flowchart showing enrollment of cases

Table 1: showing different demographic variables

Variables	Total (n=325)
Mean Age (years)	48.48 ± 6.9
Male	89(56.69%)
Female	68 (43.31%)
Hypertension	12 (7.64%)
Diabetes	08(5.09%)

Electrocardiographic assessment revealed that 91 (58%) patients had normal ECG, 04 (2.52%) had broad QRS complexes, 09 (5.73%) had diffuse T-wave inversions, 02 (1.27%) had low-voltage QRS complexes and 12 (7.64%) patients had non-specific ST segment changes while sinus bradycardia was documented in 09 (5.73%) patients, sinus tachycardia in 24 (15.28%) and atrial fibrillation in 06 (3.82%) patients [Table 2].

Echocardiographic evaluation showed that all the 157 (100%) patients had normal left ventricular ejection fraction, 05 (3.18%) had left ventricular diastolic dysfunction and only 04 (2.55%) developed pericardial effusion while neither of the patient had global hypokinesia or any new valvular lesions [Table 3].

Table 2: showing various ECG patterns in dengue patients

ECG Findings	Number of Patients (n=157)	Percentage (%)
Normal Electrocardiogram	91	58
Broad 'QRS' Complex	04	2.52
Diffuse 'T' Wave Inversion	09	5.73
Low Voltage 'QRS' Complex	02	1.27
Non-Specific 'ST' Segment Changes	12	7.64
Sinus Bradycardia	09	5.73
Sinus Tachycardia	24	15.28
Atrial fibrillation	06	3.82

Table 3: showing distribution of various echo findings in dengue patients

Distribution of ECHO Findings	No. of Patients (n=157)	Percentage %
Diastolic Dysfunction	5	3.18
Global Hypokinesia	0	0.0
LVEF % (Normal)	157	99.9
Pericardial Effusion	4	2.55
New valvular lesions	0	0.0

Discussion

The dengue virus infection may be self-limited febrile illness called dengue fever (DF) or severe cases called dengue hemorrhagic fever (DHF) and dengue shock syndrome (DSS).¹⁷ This study revealed that 42% of the patients admitted with dengue fever exhibited various cardiac manifestations on ECG encompassing non-specific ST-T changes to rhythm abnormalities like atrial fibrillation. While only 5.73% of the patients showed cardiac involvement when assessed with echocardiography of which 2.55% developed pericardial effusion. Fortunately, the cardiac abnormalities encountered in these patients were transient and shown reversal after they were released from the hospital.

In a similar prospective study, conducted in India by Datta et al.¹⁸, One in 15 individuals (12.5%) developed heart involvement, and 8 of them (6.56%) experienced bradyarrhythmia. 2 individuals also developed temporary 2:1 AV block and atrial fibrillation. Over weeks, everyone had a typical healing. Within 3 months, 4 individuals who had left ventricular systolic dysfunction (ejection fraction: 36%–46%) spontaneously recovered. Pericardial effusion occurred in two individuals, but it went away in just 2 weeks.¹⁷ In addition, a similar research conducted in 2020 by Shah et al. discovered that 112 (35%) of the three hundred and twenty individuals chosen for the study exhibited modifications of

cardiac involvement as discovered by examinations. Each one of them had an altered ECG. The most prevalent anomaly was sinus bradycardia despite fever (n = 63; 19.8%). The left ventricular ejection fraction was less than 40% in 42 individuals (13.2%).¹⁹

Whereas, in contrast to aforementioned studies, our study showed that 66 patients (42%) had cardiac involvement on ECG in which nine patients (5.73%) had bradyarrhythmia while most predominant finding was sinus tachycardia observed in 24 patients (15.28%). Atrial fibrillation was reported in 06 patients (3.82%) while only 09 patients (5.73%) had cardiac involvement on echocardiographic evaluation in which 05 patients (3.18%) had diastolic dysfunction and 04 patients (2.55%) developed pericardial effusion which subsided spontaneously over the period of two weeks.

Since nascent outbreaks of dengue virus, abnormal ECG findings have aided in early detection of cardiac involvement in dengue fever.¹⁶ Apart from ECG, echocardiographic evaluation remains the corner stone for hemodynamic and structural assessment of patients with dengue virus infection.²⁰

Dengue is an evolving and prevalent viral illness that may have array of cardiac manifestations particularly in endemic countries like ours. It can be asymptomatic or have negligible cardiac involvement in mild illness but can progress to serious forms of cardiac abnormalities if severe or left untreated. Thus, early detection of cardiac involvement through screening via non-invasive and readily available modalities like ECG and echocardiography should be the goal in every patient diagnosed with dengue fever for diagnostic, therapeutic and prognostic purposes.

Conclusion

It is observed that cardiac involvement of any degree is not uncommon in dengue fever. Therefore, Individuals with infections caused by the dengue virus who come to hospitals should be screened for any possible cardiac involvement for prompt and timely management.

References

1. Schaefer TJ, Panda PK, Wolford RW. Dengue Fever. [Updated 2022 Apr 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430732/>
2. Hasan S, Jamdar SF, Alalowi M, Al Ageel Al Beaiji SM. Dengue virus: A global human threat: Review of literature. *J Int Soc Prev Community Dent*. 2016 Jan-Feb;6(1):1-6. doi: 10.4103/2231-0762.175416. PMID: 27011925; PMCID: PMC4784057.
3. World Health Organization (WHO). (2019). Dengue, guidelines for diagnosis, treatment, prevention and control. Geneva. Switzerland: WHO, 2009.
4. Shabbir, W., Pilz, J. & Naeem, A. A spatial-temporal study for the spread of dengue depending on climate factors in Pakistan (2006–2017). *BMC Public Health* 20, 995 (2020). <https://doi.org/10.1186/s12889-020-08846-8>

5. Jahan F. (2011). Dengue Fever (DF) in Pakistan. *Asia Pacific family medicine*, 10(1), 1. <https://doi.org/10.1186/1447-056X-10-1>
6. Malavige GN, Fernando S, Fernando DJ, Seneviratne SL. Dengue viral infections. *Postgrad Med J*. 2004 Oct;80(948):588-601. doi: 10.1136/pgmj.2004.019638. PMID: 15466994; PMCID: PMC1743110.
7. Wang, X., Li, T., Shu, Y., Zhang, J., Shan, X., Li, D., Ma, D., Long, S., Pan, Y., Chen, J., Liu, P., & Sun, Q. (2022). Clinical Characteristics and Risk Factors for Severe Dengue Fever in Xishuangbanna, During the Dengue Outbreak in 2019 [Original Research]. *Frontiers in Microbiology*, 13. <https://doi.org/10.3389/fmicb.2022.739970>
8. Heilman, J. M., De Wolff, J., Beards, G. M., & Basden, B. J. (2014). Dengue fever: a Wikipedia clinical review. *Open medicine : a peer-reviewed, independent, open-access journal*, 8(4), e105–e115.
9. Malik J, Iltaf Satti D78 Cardiovascular manifestations of dengue *Heart* 2022;108:A58.
10. Kumar, S., Papalkar, P., Sarode, R., & Acharya, S. (2019). Cardiac manifestations in dengue. *Indian Journal of Medical Specialities*, 10(1), 30. https://doi.org/10.4103/injms.injms_34_18
11. Furlan-Daniel R. A., Santos L. F. S., Geleilate T. J. M., Restini C. B. A., & Bestetti R. B. (2019). Abnormalities in electrocardiographic ventricular repolarization in patients with dengue virus infection. *The Journal of Infection in Developing Countries*, 13(08), 759-763. <https://doi.org/10.3855/jidc.10746>
12. Parchani, A., Krishnan Vs, G., & Kumar, V. K. S. (2021). Electrocardiographic Changes in Dengue Fever: A Review of Literature. *International journal of general medicine*, 14, 5607–5614. <https://doi.org/10.2147/IJGM.S328755>
13. Datta, G., & Mitra, P. (2019). A Study on Cardiac Manifestations of Dengue Fever. *The Journal of the Association of Physicians of India*, 67(7), 14–16.
14. Rahim, A., Hameed, A., Ishaq, U., Malik, J., Zaidi, S. M. J., Khurshid, H., Malik, A., Satti, D. I., & Naz, H. (2022). Cardiovascular sequelae of dengue fever: a systematic review. *Expert review of cardiovascular therapy*, 20(6), 465–479. <https://doi.org/10.1080/14779072.2022.2082945>
15. Mansanguan, C., Hanboonkunupakarn, B., Muangnoicharoen, S., Huntrup, A., Poolcharoen, A., Mansanguan, S., ... Phumratanaprapin, W. (2021). Cardiac evaluation in adults with dengue virus infection by serial echocardiography. *BMC Infectious Diseases*, 21(1). <https://doi.org/10.1186/s12879-021-06639-x>
16. Kularatne, S. A., Pathirage, M. M., Kumarasiri, P. V., Gunasena, S., & Mahindawanse, S. I. (2007). Cardiac complications of a dengue fever outbreak in Sri Lanka, 2005. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 101(8), 804–808. <https://doi.org/10.1016/j.trstmh.2007.02.021>
17. Noor, M., Khan, A., Rehman, F., & Rasheed, A. (2019). Epidemiology of Dengue in Southern Districts of Khyber Pakhtunkhwa, Pakistan. *Pakistan J. Parasitol.*, 68(2), 11-21.
18. Datta, G., & Mitra, P. (2019). A Study on Cardiac Manifestations of Dengue Fever. *The Journal of the Association of Physicians of India*, 67(7), 14–16.
19. Shah, C., Vijayaraghavan, G., & Kartha, C. C. (2021). Spectrum of cardiac involvement in patients with dengue fever. *International Journal of Cardiology*, 324, 180-185.

20. Miranda, C. H., Borges, M. D. C., Matsuno, A. K., Vilar, F. C., Gali, L. G., Volpe, G. J., ... & da Fonseca, B. A. L. (2013). Evaluation of cardiac involvement during dengue viral infection. *Clinical infectious diseases*, 57(6), 812-819. doi: 10.1093/cid/cit403.